AF4978N

N-Channel Enhancement Mode Power MOSFET

■ Features

- Low Gate Charge
- Single Drive Requirement
- Surface Mount Package
- Pb Free Plating Product

■ General Description

The advanced power MOSFET provides the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

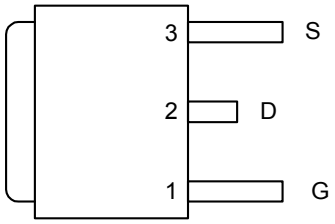
The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

■ Product Summary

BV_{DSS} (V)	$R_{DS(ON)}$ (mΩ)	I_D (A)
60	100	11

■ Pin Assignments

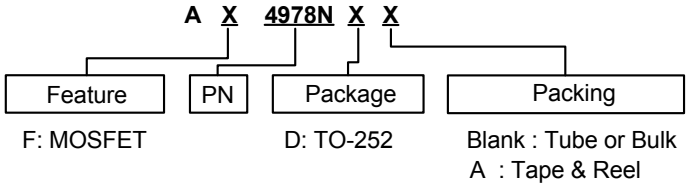
(Front View)



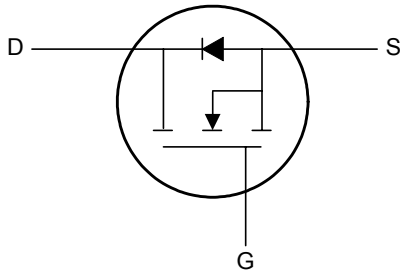
■ Pin Descriptions

Pin Name	Description
S	Source
G	Gate
D	Drain

■ Ordering information



■ Block Diagram



N-Channel Enhancement Mode Power MOSFET

■ Absolute Maximum Ratings

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		60	V
V_{GS}	Gate-Source Voltage		±25	V
I_D	Continuous Drain Current, V_{GS}=10V	T_C=25ºC	11	A
		T_C=100ºC	6.8	
I_{DM}	Pulsed Drain Current **(Note 1)**		45	A
P_D	Total Power Dissipation	T_C=25ºC	21	W
	Linear Derating Factor		0.17	W/ºC
T_{STG}	Storage Temperature Range		-55 to 150	ºC
T_J	Operating Junction Temperature Range		-55 to 150	ºC

■ Thermal Data

Symbol	Parameter		Maximum	Units
$R_{\theta JC}$	Thermal Resistance Junction-Case	Max.	6	ºC/W
$R_{\theta JA}$	Thermal Resistance Junction- Ambient	Max.	110	ºC/W

■ Electrical Characteristics at T_J=25ºC unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	60	-	-	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I_D=1mA	-	0.04	-	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance **(Note 2)**	V_{GS}=10V, I_D=5A	-	-	100	mΩ
		V_{GS}=4.5V, I_D=4A	-	-	125	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=5A	-	7	-	S
I_{DSS}	Drain-Source Leakage Current (T_J=25°C)	V_{DS}=60V, V_{GS}=0V	-	-	10	uA
	Drain-Source Leakage Current (T_J=150°C)	V_{DS}=48V, V_{GS}=0V	-	-	25	
I_{GSS}	Gate-Source Leakage	V_{GS}=±25V	-	-	±100	nA
Q_g	Total Gate Charge **(Note 2)**	I_D=5A, V_{DS}=48V, V_{GS}=4.5V	-	6	10	nC
Q_{gs}	Gate-Source Charge		-	2	-	
Q_{gd}	Gate-Drain ("Miller") Charge		-	3	-	
$t_{d(on)}$	Turn-On Delay Time **(Note 2)**	V_{DS}=30V, I_D=5A, R_G=3.3Ω, V_{GS}=10V R_D=6Ω	-	6	-	ns
t_r	Rise Time		-	11	-	
$t_{d(off)}$	Turn-Off Delay Time		-	14	-	
t_f	Fall-Time		-	2	-	
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1.0MHz	-	485	780	pF
C_{oss}	Output Capacitance		-	55	-	
C_{rss}	Reverse Transfer Capacitance		-	40	-	

■ Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Forward On Voltage **(Note 2)**	I_S=5A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time	I_S=5A, V_{GS}=0V, dI/dt=100A/μs	-	23	-	ns
Q_{rr}	Reverse Recovery Charge		-	28	-	nC

Note 1: Pulse width limited by Max. junction temperature.
Note 2: Pulse width ≤ 300us, duty cycle ≤ 2%.

■ Typical Performance Characteristics

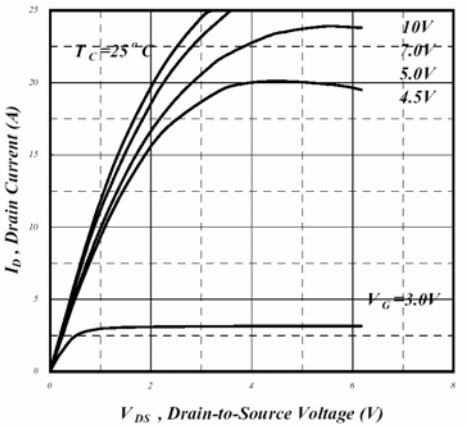


Fig 1. Typical Output Characteristics

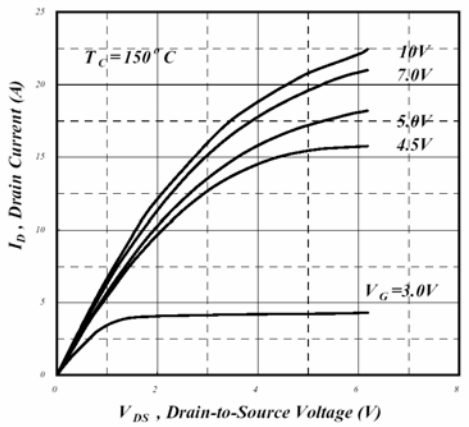


Fig 2. Typical Output Characteristics

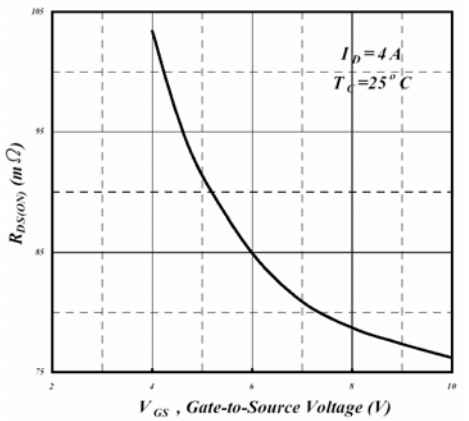


Fig 3. On-Resistance v.s. Gate Voltage

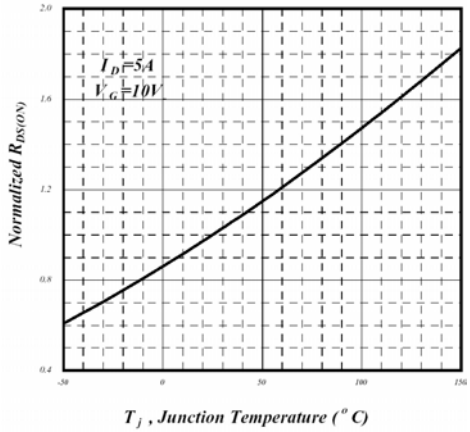


Fig 4. Normalized On-Resistance v.s. Junction Temperature

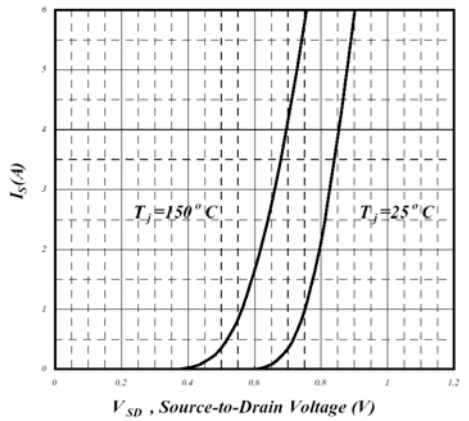


Fig 5. Forward Characteristic of Reverse Diode

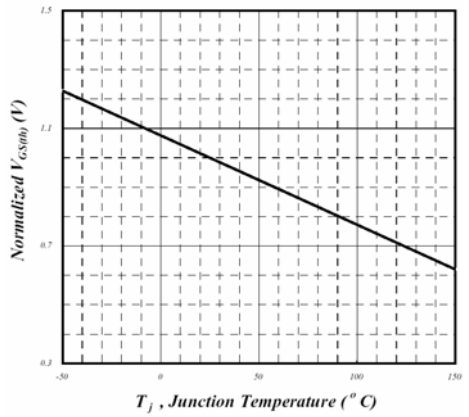


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

■ Typical Performance Characteristics (Continued)

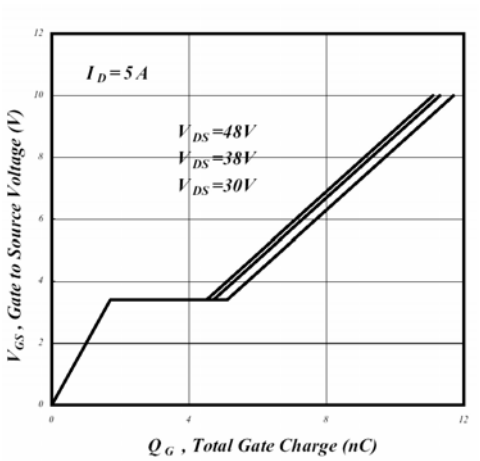


Fig 7. Gate Charge Characteristics

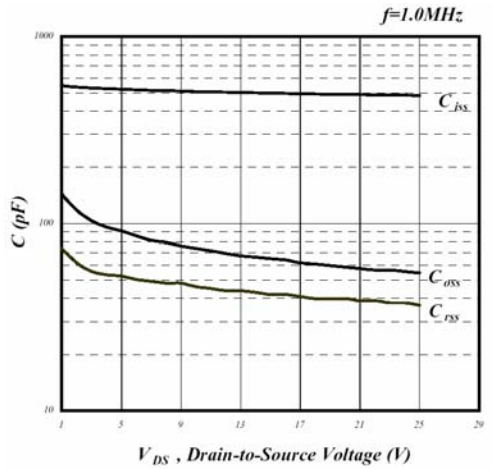


Fig 8. Typical Capacitance Characteristics

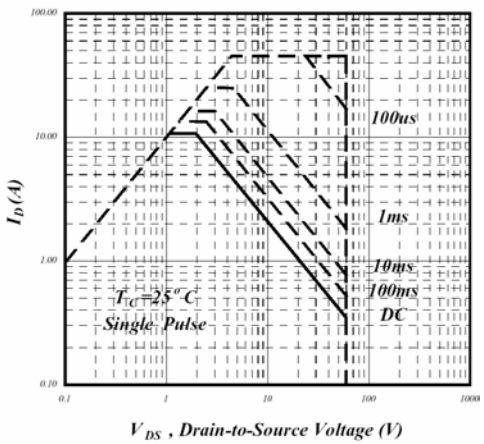


Fig 9. Maximum Safe Operating Area

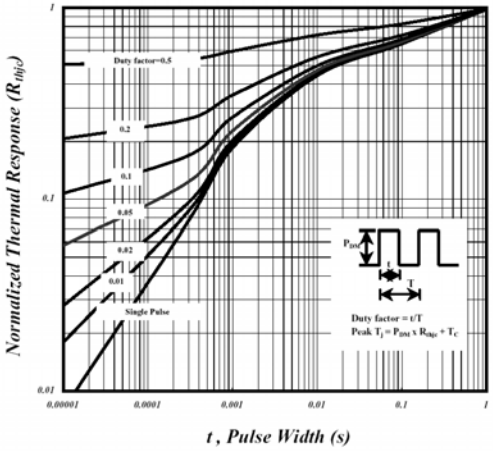


Fig 10. Effective Transient Thermal Impedance

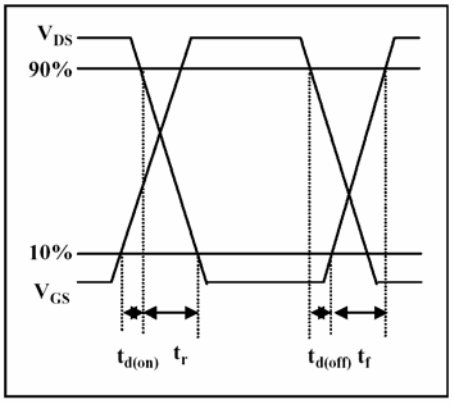


Fig 11. Switching Time Waveform

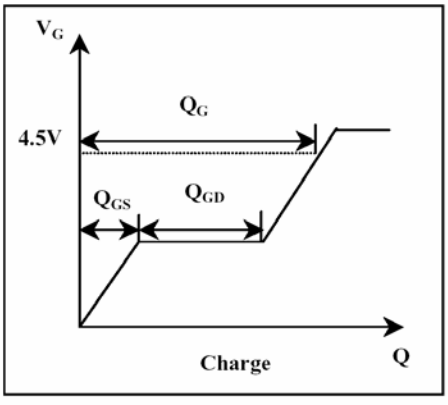
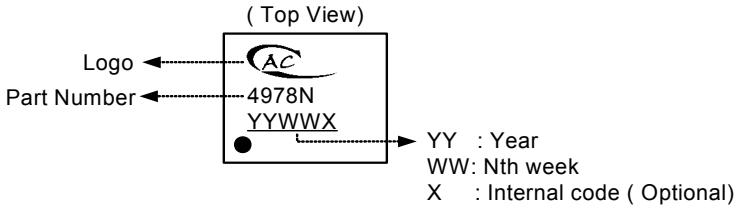


Fig 12. Gate Charge Waveform

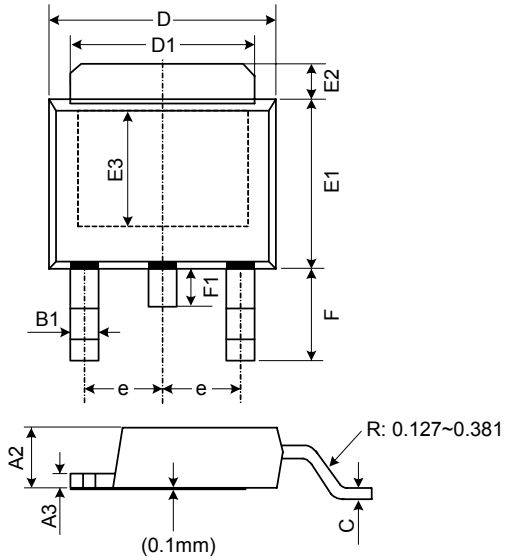
■ Marking Information

TO-252



■ Package Information

Package Type: TO-252



1. All Dimensions Are in Millimeters.
2. Dimension Does Not Include Mold Protrusions.

Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A2	1.80	2.30	2.80
A3	0.40	0.50	0.60
B1	0.40	0.70	1.00
D	6.00	6.50	7.00
D1	4.80	5.35	5.90
F	2.20	2.63	3.05
F1	0.50	0.85	1.20
E1	5.10	5.70	6.30
E2	0.50	1.10	1.70
E3	3.50	4.00	4.50
e	-	2.30	-
C	0.35	0.50	0.65

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ООО «НИОКР СИТЕМС»
Москва, 125362, Россия, ул. Вишневая, д. 9, к. 1, Блок 104 а и 104 в

Телефон: 8 (495) 268-14-82
Email: n@nsistems.ru

ИНН: 7735154786
ОГРН: 1167746717709